WHAT IS CLAIMED IS:

1. A predictive weight generator adapted to reduce an amount of waveshaping processing applied to a plurality of input symbol streams by a waveshaping circuit, where the waveshaping processing reduces an amplitude of at least one input symbol stream, the predictive weight generator comprising:

pulse-shaping filter emulation circuits configured to receive the plurality of input symbol streams that are also applied as inputs to the waveshaping circuit, where the pulse-shaping filter emulation circuits emulate the mapping of actual pulse-shaping filters in the waveshaping circuit;

mixers coupled to the pulse-shaping filter emulation circuits and to digital numerically controlled oscillators, where the digital numerically controlled oscillators also upconvert actual outputs of actual pulse-shaping filters for the input symbol streams;

a summing circuit adapted to combine the outputs of the mixers to a simulated composite signal to predict an amplitude of an actual composite signal;

a comparator adapted to compare the predicted amplitude to a threshold level and to provide weight value modifications to the waveshaping circuit in response to the comparison; and

a delay circuit adapted to delay the plurality of input symbol streams to the waveshaping circuit, where the delay is substantially equal to a computational latency of a computational path including the pulse-shaping filter emulation circuits, the mixers, the summing circuit, and the comparator such that the waveshaping circuit receives the weight value modifications from the predictive weight generator in real time.

2. The predictive weight generator as defined in Claim 1, wherein the pulse-shaping filter emulation circuits comprise actual pulse-shaping filters.

3. The predictive weight generator as defined in Claim 1, wherein the weight value modifications provided by the comparator correspond to a binary value with a first state and a second state, such that waveshaping in the waveshaping circuit is enabled in the first state and is disabled in the second state.

4. A post-conditioning circuit that generates a de-cresting pulse that can decrease an amplitude of a signal peak of a composite multicarrier signal in real time, where the composite multicarrier signal includes a plurality of input symbol streams that are pulse-shaped and frequency upconverted to a plurality of upconverted streams, the post-conditioning circuit comprising:

a comparator configured to compare the composite multicarrier signal to a predetermined threshold, where the comparator activates an output when the composite multicarrier signal exceeds the predetermined threshold;

a weight generator that receives the plurality of upconverted streams and a phase information from a plurality of oscillators that provide carrier waveforms for the plurality of upconverted streams, where the weight generator calculates a weight value for an upconverted stream in the plurality of upconverted streams, where the weight value is approximately proportional to the upconverted stream's contribution to the composite multicarrier signal's signal peak;

an impulse generator coupled to the comparator, where the impulse generator provides an impulse as an output in response to the output of the comparator, where the impulse generator also controls a duration of the generated impulse in response to the output of the comparator;

a multiplier circuit adapted to multiply the weight value from the weight generator with the impulse from the impulse generator to generate a scaled impulse; and

a bandpass filter that filters the scaled impulse to a frequency band that corresponds to the upconverted stream's allocated frequency band to generate the de-cresting pulse.

5. The post-conditioning circuit as defined in Claim 4, wherein the bandpass filter has a response selected from the group consisting of a Gaussian response, a Square Root Raised Cosine (SRRC) response, a Raised Cosine (RC) response, and a Sinc response.

6. The post-conditioning circuit as defined in Claim 4, wherein the bandpass filter is a finite impulse response (FIR) filter.

7. The post-conditioning circuit as defined in Claim 4, wherein the composite multicarrier signal propagates to the comparator in a first path, further comprising:

a delay circuit adapted to receive the composite multicarrier signal from a second path and to delay the composite multicarrier signal by a time approximately equal to the latency of a sum of the comparator, the impulse generator, the multiplier, and the bandpass filter, where an output of the delay circuit is a delayed composite multicarrier signal; and

a summing circuit configured to combine the delayed composite multicarrier signal with the de-cresting pulse to reduce the signal peak.

8. The post-conditioning circuit as defined in Claim 4, wherein the de-cresting pulse comprises a plurality of de-cresting pulses, wherein:

the weight generator calculates a plurality of weight values corresponding to the plurality of upconverted streams, where a weight value from the plurality of weight values is approximately proportional to the corresponding upconverted stream's contribution to the composite multicarrier signal's signal peak;

the multiplier circuit comprises a plurality of multiplier circuits for the plurality of upconverted streams, where each multiplier circuit in the plurality of multiplier circuits multiplies the impulse from the impulse generator with a weight value for the corresponding upconverted stream such that the plurality of multiplier circuits generates a plurality of scaled impulses; and

the bandpass filter comprises a plurality of bandpass filters that filter the scaled impulses to frequency bands that correspond to the upconverted streams' allocated frequency bands to generate the plurality of de-cresting pulses.

9. A pulse-shaping circuit that reduces a probability of an alignment in amplitude and phase of similar symbols in a plurality of input symbol streams including at least a first input symbol stream and a second input symbol stream, where the plurality of input symbol streams are eventually upconverted and combined to a composite data stream such that a reduction in the probability of the alignment reduces a

probability of a large signal crest in the composite data stream, the pulse-shaping circuit comprising:

a plurality of pulse-shaping filters adapted to pulse-shape the plurality of input symbol streams to a corresponding plurality of baseband streams;

a plurality of multipliers adapted to receive a plurality of input carrier streams and to upconvert the plurality of baseband streams to a plurality of upconverted streams;

a summing circuit that combines the upconverted streams to the composite signal; and

a delay circuit in at least a first data path, where the first data path is a path from an input symbol stream to the composite data stream, where the delay circuit delays data in the first data path by a fraction of a symbol period relative to data in a second data path.

10. The pulse-shaping circuit as defined in Claim 9, wherein the at least first data path comprises a plurality of data paths with delay circuits, wherein the delay circuits delay data in their respective data paths relative to data in the second data path with delays distributed approximately evenly through the symbol period.

11. The pulse-shaping circuit as defined in Claim 9, wherein the delay circuit in the first data path is configured to delay data between the first input symbol stream and the first pulse shaped filter.

12. A composite waveform de-cresting circuit that digitally generates at least one de-cresting phase shift in real time that allows a composite multicarrier signal to be generated with a decrease in an amplitude of a signal peak, where the composite multicarrier signal includes a plurality of input symbol streams that are pulse-shaped and frequency upconverted, where an application of the de-cresting phase shift decreases the amplitude of the signal peak of the composite multicarrier signal without altering an amplitude of the plurality of input symbol streams, the composite waveform de-cresting circuit comprising:

a computation circuit that receives the plurality of upconverted streams and a phase information from a plurality of oscillators that provide carrier

waveforms for the plurality of upconverted streams, the computation circuit configured to predict a level in the composite multicarrier signal;

a comparator configured to compare the predicted level of the composite multicarrier signal from the computation circuit to a predetermined threshold, where the comparator activates an output when the composite multicarrier signal exceeds the predetermined threshold;

a weight generator that receives the plurality of upconverted streams and a phase information from the plurality of oscillators that provide carrier waveforms for the plurality of upconverted streams, where the weight generator calculates a weight value for an upconverted stream in the plurality of upconverted streams, where the weight value is approximately proportional to the upconverted stream's contribution to the predicted level of the composite multicarrier signal's signal peak;

an impulse generator coupled to the comparator, where the impulse generator provides an impulse as an output in response to the output of the comparator, where the impulse generator also controls a duration of the generated impulse in response to the output of the comparator;

a multiplier circuit adapted to multiply the weight value from the weight generator with the impulse from the impulse generator to generate a scaled impulse;

at least one bandpass filter that filters the scaled impulse to a frequency band that corresponds to the upconverted stream's allocated frequency band to generate a de-cresting phase-shift control signal; and

at least one phase shifter coupled to the upconverted stream, where the phase shifter is configured to modulate a relative phase of the upconverted stream in response to the de-cresting phase-shift control signal.

13. The composite waveform decresting circuit as defined in Claim 12, further comprising a combining circuit coupled to sum the plurality of upconverted streams to generate the composite multicarrier signal, where the plurality of upconverted streams includes at least one phase-shifted upconverted stream .

14. The post-conditioning circuit as defined in Claim 12, wherein the bandpass filter has a Gaussian response.

15. The post-conditioning circuit as defined in Claim 12, wherein the bandpass filter is a finite impulse response (FIR) filter.

16. The post-conditioning circuit as defined in Claim 12, wherein the de-cresting pulse comprises a plurality of de-cresting pulses,

wherein the weight generator calculates a plurality of weight values corresponding to the plurality of upconverted streams, where a weight value from the plurality of weight values is approximately proportional to the corresponding upconverted stream's contribution to the predicted level of the composite multicarrier signal's signal peak;

wherein the multiplier circuit comprises a plurality of multiplier circuits for the plurality of upconverted streams, where each multiplier circuit in the plurality of multiplier circuits multiplies the impulse from the impulse generator with a weight value for the corresponding upconverted stream such that the plurality of multiplier circuits generates a plurality of scaled impulses;

wherein the at least one bandpass filter comprises a plurality of bandpass filters that filter the scaled impulses to frequency bands that correspond to the upconverted streams' allocated frequency bands to generate the plurality of de-cresting phase-shift control signals; and

wherein the at least one phase shifter comprises a plurality of phase shifters configured to modulate a relative phase of a corresponding upconverted stream in response to a corresponding de-cresting phase-shift control signal.

17. A method of controlling at least a portion of coefficients used in a waveform shaping applied to a plurality of baseband signals and a combination thereof, where the plurality of baseband signals includes at least a first baseband signal and a second baseband signal, where the waveform shaping reduces a peak to average ratio in the combination, the method comprising:

monitoring the first baseband signal prior to a first modification of the first baseband signal to a first modified baseband signal;

monitoring the second baseband signal prior to a second modification of a second baseband signal to a second modified baseband signal;

receiving a first phase information from a first oscillator, where the first phase information indicates a phase of a first oscillator signal that is mixed with the first modified baseband signal;

receiving a second phase information from a second oscillator, where the second phase information indicates a phase of a second oscillator signal that is mixed with the second baseband signal;

predicting a level of a composite waveform, where the composite waveform corresponds to a combination of at least a first mixed signal and a second mixed signal, where the first mixed signal corresponds to the first baseband signal mixed with the first oscillator signal, and the second mixed signal corresponds to the second baseband signal mixed with the second oscillator signal; and

generating a weight signal when the predicting the level indicates that the first mixed signal and the second mixed signal combine to at least partially destructively interfere, where the weight signal is used to at least partially reduce an amount of the first modification and the second modification applied to the first baseband signal and to the second baseband signal, respectively.

18. The method as defined in Claim 17, further comprising:

comparing the level of the composite waveform to a predetermined level;

generating the weight signal as a binary signal with a first state and a second state, providing the first state when the level of the composite waveform is predicted to exceed the predetermined level, and providing the second state otherwise;

enabling the first modification and the second modification when the weight signal is in a first state; and

disabling the first modification and the second modification when the weight signal is in a second state.

19. The method as defined in Claim 17, further comprising providing the weight signal to a post-conditioning pulse generator, which can apply a de-cresting

pulse to the composite signal, where the post-conditioning pulse generator reduces an amount of the de-cresting pulse applied to the composite signal.

20. The method as defined in Claim 17, further comprising:

comparing the level of the composite waveform to a predetermined level;

generating the weight signal as a binary signal with a first state and a second state, providing the first state when the level of the composite waveform is predicted to exceed the predetermined level, and providing the second state otherwise;

providing the weight signal to a post-conditioning pulse generator, which can apply a third modification to the composite signal to reduce an amplitude of a resulting modified composite signal;

enabling the first modification, the second modification, and the third modification when the weight signal is in a first state; and

disabling the first modification, the second modification, and the third modification when the weight signal is in a second state.

21. The method as defined in Claim 17, wherein the first modification of the first baseband signal to the first modified baseband signal comprises:

reducing an amplitude of a signal peak in the first baseband signal by applying a first preconditioning pulse to the first baseband signal to generate a first preconditioned baseband signal; and

pulse-shape filtering the first preconditioned baseband signal to generate the first modified baseband signal.

22. A method of digitally decreasing an amplitude of a selected portion of a composite multicarrier signal in real time, where the composite multicarrier signal includes a plurality of input symbol streams that have been pulse-shaped and frequency up-converted, the method comprising:

monitoring the plurality of input symbol streams that eventually combine to the composite multicarrier signal;

monitoring phases of a plurality of carriers from a plurality of digital numerically controlled oscillators (NCOs), where the plurality of oscillator

signals are mixed with a plurality of pulse-shaped input signal streams to upconvert the plurality of pulse-shaped input signal streams;

monitoring the composite multicarrier signal to identify a signal peak above a selected threshold;

determining a first symbol stream's contribution to the detected signal peak in the composite multicarrier signal;

generating at least a first band-limited pulse selected to destructively interfere with at least a portion of the identified signal peak, where the first band-limited pulse is substantially limited to a frequency band allocated to the first symbol stream; and

combining the composite multicarrier signal with the at least one band-limited pulse to reduce the signal peak.

23. The method as defined in Claim 22, wherein the at least one band-limited pulse comprises a plurality of band-limited pulses, the method further comprising:

determining each symbol stream's contribution to the detected peak in the composite multicarrier signal; and

generating a corresponding band-limited pulse for each symbol stream, where each band-limited pulse is selected to destructively interfere with the corresponding symbol stream, where a magnitude of a band-limited pulse varies depending on the corresponding symbol stream's contribution to the detected peak in the composite multicarrier signal, where the band-limited pulse is substantially limited to a frequency band allocated to the corresponding symbol stream.

24. The method as defined in Claim 22, wherein the band-limited pulse is selected from the group consisting of a band-limited Gaussian pulse, a band-limited Square Root Raised Cosine (SRRC) pulse, a band-limited Raised Cosine (RC) pulse, and a band-limited Sinc pulse.

25. The method as defined in Claim 22, further comprising generating the first band-limited pulse by:

generating an impulse;

scaling the impulse according to the first symbol stream's contribution to the detected signal peak in the composite multicarrier signal; and

filtering the impulse with a finite impulse response (FIR) filter configured to bandpass filter the scaled impulse to a frequency band allocated to the first symbol stream.

26. A method of digitally reducing a probability of an alignment in amplitude and phase of similar symbols in a plurality of data streams, where the plurality of data streams are eventually pulse-shaped, upconverted, and combined to a composite data stream such that a reduction in the probability of the alignment reduces a probability of large signal crest in the composite data stream, the method comprising:

receiving the plurality of data streams, where the plurality of data streams include at least a first data stream and a second data stream; and

delaying the second data stream relative to the first data stream by a fraction of a symbol period prior to the eventual combining of the plurality of data streams.

27. The method as defined in Claim 26, wherein the plurality of data streams includes the first data stream and other data streams, wherein the fraction of the symbol period from which the other data streams are delayed relative to the first data stream substantially evenly through the symbol period.

28. The method as defined in Claim 26, wherein the plurality of data streams includes "N" data streams, wherein the fraction of the symbol period from a data stream other than the first data stream is delayed relative to the first data stream by about a fraction of time equal to a multiple of the symbol period divided by N, so that the data streams other than the first data stream are substantially evenly delayed through the symbol period.

29. The method as defined in Claim 26, wherein the fraction of the symbol period is configurable.

30. A method of digitally decreasing an amplitude of a selected portion of a composite multicarrier signal in real time, where the composite multicarrier signal includes a plurality of input symbol streams that are pulse-shaped and frequency up-converted, where the method decreases an amplitude of the selected portion of the

composite multicarrier signal without modification to an amplitude of the plurality of input symbol streams, the method comprising:

monitoring phases of a plurality of carriers from a plurality of digital numerically controlled oscillators (NCOs), where the plurality of oscillator signals are mixed with a plurality of pulse-shaped input signal streams to upconvert a plurality of pulse-shaped input signal streams;

monitoring a plurality of pulse-shaped and frequency upconverted data streams that eventually combine to the composite multicarrier signal;

predicting a signal peak in a composite multicarrier signal that is above a selected threshold;

estimating a first pulse-shaped and frequency upconverted data stream's contribution to the predicted signal peak;

generating at least a first band-limited pulse selected to modulate a phase, where the first band-limited pulse is substantially limited to a frequency band allocated to the first symbol stream, where a scaling of the first band-limited pulse depends on the first pulse-shaped and frequency upconverted data stream's contribution to the predicted signal peak;

phase modulating the first pulse-shaped and frequency upconverted data stream according to the first band-limited pulse; and

combining the plurality of pulse-shaped and frequency upconverted data streams.

31. The method as defined in Claim 30, wherein the at least one band-limited pulse comprises a plurality of band-limited pulses, the method further comprising:

determining each pulse-shaped and frequency upconverted data stream's contribution to the detected peak in the composite multicarrier signal; and

generating a corresponding band-limited pulse for each pulse-shaped and frequency upconverted data stream, where each band-limited pulse is selected to modulate a phase of a corresponding pulse-shaped and frequency upconverted data stream, where a magnitude of a band-limited pulse varies depending on the corresponding pulse-shaped and frequency upconverted data stream's contribution to the detected peak in the composite multicarrier signal, where the

band-limited pulse is substantially limited to a frequency band allocated to the corresponding pulse-shaped and frequency upconverted data stream.

32. The method as defined in Claim 30, wherein the band-limited pulse is a Gaussian pulse.

33. The method as defined in Claim 30, further comprising generating the first band-limited pulse by:

generating an impulse;

scaling the impulse according to the first pulse-shaped and frequency upconverted data stream's contribution to the detected signal peak in the composite multicarrier signal; and

filtering the impulse with a finite impulse response (FIR) filter configured to filter the scaled impulse to a frequency band allocated to the first pulse-shaped and frequency upconverted data stream.

34. The method as defined in Claim 30, wherein the input symbol streams are pulse shaped according to an Enhanced Data GSM (Group System for Mobile Communications) Environment (EDGE) air interface standard.